City of Chandler

High Capacity Transit Major Investment Study

FINAL REPORT

Prepared For:

City of Chandler
215 East Buffalo Street
Chandler, AZ 85225

In Cooperation With:

Valley Metro
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Phoenix, AZ 85003

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July 2003

City of Chandler
Transit Plan Update and
High Capacity Transit
Major Investment Study

Final

HIGH CAPACITY TRANSIT MAJOR INVESTMENT STUDY

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RESOLUTION NO. 3611

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CHANDLER, ARIZONA, TO ACCEPT THE HIGH CAPACITY TRANSIT MAJOR INVESTMENT STUDY AND ADOPT A LOCALLY PREFERRED ALTERNATIVE FOR FUTURE DEVELOPMENT OF A HIGH CAPACITY TRANSIT SYSTEM IN CHANDLER.

WHEREAS, the City of Chandler Transportation Study adopted under Resolution 3391 recommended completion of a High Capacity Transit Major Investment Study to identify corridors where high capacity transit can be integrated most effectively; and

WHEREAS, the City contracted with the Maricopa Association of Governments on July 12, 2001 for Federal Highway Administration funds for a High Capacity Transit Major Investment Study for the City; and

WHEREAS, it is deemed in the best interest of the City of Chandler that specific corridors be identified for future development of a high capacity transit system;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Chandler, Arizona, that the City accepts the High Capacity Transit Major Investment Study and the locally preferred alternatives for high capacity transit in Chandler as shown below:

1. Implement neighborhood, local and express bus transit in accordance with the Chandler Transit Plan

2. Implement transit system enhancements for existing and future transit service, and future bus rapid transit service to include queue jumper, traffic signal priority features, bus stop/station enhancements, and other system enhancements

3. Implement bus rapid transit (BRT) service as transit ridership increases and service is warranted

4. Implement light rail transit (LRT) service as transit ridership increases and service is warranted

5. The following corridors are designated for development of high capacity transit systems:
   a. Rural Road
   b. Chandler Boulevard
   c. Arizona Avenue/Union Pacific Railroad Chandler Branch Line

PASSED AND ADOPTED by the City Council of the City of Chandler, Arizona this 27th day of February 2003.

ATTEST:

CITY CLERK MAYOR

CERTIFICATION:

I HEREBY CERTIFY that the above and foregoing Resolution no. 3611 was duly passed and adopted by the City Council of the City of Chandler, Arizona, at the regular meeting held on the 27th day of February 2003 and that a quorum was present thereat.

Marla Paddock
CITY CLERK

APPROVED AS TO FORM:

Dennis M. O'Neill
CITY ATTORNEY

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FOREWORD

The High Capacity Transit Major Investment Study (MIS) was undertaken to identify the high capacity transit projects that could address the future travel demands in Chandler and other parts of the East Valley. The study entailed a systematic review of a number of factors, including future travel patterns, the region's rail and express service plans, and the physical and financial requirements of the alternatives. The MIS effort began in July 2001 and concluded with City Council adoption of the locally preferred alternative on February 27, 2003.

The MIS was conducted as a partnership between the City of Chandler, the Maricopa Association of Governments (MAG), and the Regional Public Transportation Authority (RPTA). These three agencies worked together to identify the transit needs and appropriate projects in Chandler, and to help bring these projects on line as part of the region's transportation development process. The consultant team was led by BRW, Inc., with subconsultants ADYE DESIGN, INC. providing environmental and design assistance, and Manuel Padron & Associates providing financial analysis.

The purpose of this MIS Final Report is to document the technical analysis undertaken in the MIS process and the resulting locally preferred alternative. The report consists of the following elements.

- Executive Summary The transit improvement alternatives considered in Tier 3 and the components of the adopted locally preferred alternative are summarized in this section.
- Evaluation Methods Report (Appendix A) This report describes the criteria and measurements used in evaluating corridors and technologies in the Tier 1, Tier 2, and Tier 3 phases of the study.
- Opportunities and Constraints Report (Appendix B) The report documents the status of current and recent studies, and provides existing and future information for candidate travel corridors in the study area.
- Tier 1 Report (Appendix C) The initial evaluation of 13 corridors and 8 transit modes is documented in this report.
- Tier 2 Report (Appendix D) This report presents the more detailed evaluation of alternatives developed from the most promising corridors and modes in the Tier 1 analysis.
- Tier 3 Report (Appendix E) The evaluation of the five most promising alternatives from the Tier 2 analysis is presented in this report. Included are recommendations for the locally preferred alternative that became the basis for the Council's action.
- Summary of Federal Project Development Process (Appendix F) This memo outlines the steps required to move the locally preferred alternative projects through the process for the receipt of federal funds.

E.0 EXECUTIVE SUMMARY

E.1 MIS OVERVIEW

The MIS provided a framework for considering long range transit improvements and compliments the Transit Plan Update adopted by the Chandler City Council on August 8, 2002. It included three levels of analysis: Tier 1, Tier 2, and Tier 3. As the effort progressed from one tier to the next, the number of alternatives considered was reduced while the technical level of detail increased. The Tier 1 analysis, completed in October 2002, narrowed a wide range of technologies and corridors to the ones most suitable for further study. The Tier 2 effort combined the technologies and corridors into seven specific alternatives. Completed in January 2003, this analysis recommended the five alternatives considered in the Tier 3 analysis. This Executive Summary describes the analysis conducted in the more detailed Tier 3 phase, and reports the improvements adopted by the Chandler City Council on February 27, 2003 to be implemented as part of the City's transit development strategy.

E.2 TIER 3 ALTERNATIVES

The following alternatives were evaluated in the Tier 3 phase of the MIS.

Alternative 1: Tempe Branch/Chandler Blvd Light Rail Transit (LRT)

LRT service would be provided between Downtown Tempe and Downtown Chandler. It would begin at the connection with the Central Phoenix/East Valley (CP/EV) LRT line and the Tempe Branch Railroad in Tempe. It would proceed south in the railroad right of way to Chandler Boulevard, where it would turn east to run in the median of Chandler Boulevard to a terminal station in Downtown Chandler located between Arizona Avenue and the Chandler Branch Railroad right of way. It would be constructed in the existing Chandler Boulevard right of way, converting two existing traffic lanes to the LRT guideway.

(The initial north-south portion of this alternative was proposed to use the Tempe Branch Railroad. However, with the majority of mileage for both the railroad and Rural Road alignments located within the City of Tempe, issues related to consistency with Tempe's transportation plans became a dominant consideration following conclusion of the MIS technical analysis. Located approximately one mile east of the railroad, Rural Road was found to be capable of serving the travel demand in the western portion of Chandler and Tempe. The Rural Road corridor was evaluated in Tier One, and scored slightly lower than the Tempe Branch line due to concerns about right-of-way availability and potential loss of vehicle lane capacity. However, as final recommendations were being formulated, Rural Road had greater support from both the Chandler Transportation Commission and the City of Tempe. The Council ultimately approved the inclusion of Rural Road as part of the locally preferred alternative.)

Alternative 2: Chandler Blvd Bus Rapid Transit (BRT)

BRT service would operate on Chandler Boulevard and Williams Field Road between Desert Foothills Parkway in Ahwatukee (at the current terminal of Route 156) and Power Road at Williams Gateway Airport. The alignment would be located in mixed flow curb lanes on Chandler Boulevard, with direct service to the Chandler Fashion Center and the future Downtown Chandler Transit Center.

Alternative 3: Arizona Ave LRT

The CP/EV LRT line would be extended from the Main Street/Country Club Drive LRT Station in Mesa to the Chandler Airpark area via Country Club Drive and Arizona Avenue. The terminal station would be located near the Arizona Avenue/Queen Creek Road intersection. The alignment would be in the median of the street, except for the connection to serve the future Downtown Chandler Transit Center.

Alternative 3B: Arizona Ave BRT

This alternative is similar to Alternative 3A, but with BRT instead of LRT on Arizona Avenue and Country Club Drive. The service would extend from the Main Street/Country Club Drive LRT Station in Mesa to the Chandler Airpark area. The terminal station would be located near the Arizona Avenue/Queen Creek Road intersection. The service would operate in mixed flow curb lanes, except for the connection to serve the future Downtown Chandler Transit Center.

Alternative 4: Chandler Branch LRT

An LRT line would be constructed between Mesa and the Chandler Airpark using the Chandler Branch Railroad right-of-way for an extensive portion of the alignment. From the connection to the CP/EV line at the Main Street/Center Street LRT Station in Mesa, the line would run south on Center Street to the vicinity of the Center Street/Broadway Road intersection. The line would then run along the eastern edge of the railroad right of way to the vicinity of Baseline Road. At this point, a grade-separated crossing of the UP main line would be provided to transition the LRT line to the western side of the Chandler Branch right of way (assuming freight service continues to operate in the Chandler Branch). It would continue south to the Chandler Airpark area, with the terminal station near the crossing of Queen Creek Road. It would serve the future Downtown Chandler Transit Center.

E.3 ANALYSIS PROCESS AND RESULTS

The Tier 3 criteria were selected to provide the highest level of detail in the MIS analysis and to focus on the aspects of the projects best able to differentiate between the alternatives. The criteria were organized into categories as described below.

- Service Performance - Ridership forecast, connections with other transit services, service to underserved populations, and safety.
- Financial Performance - Estimates of capital cost, operating and maintenance cost, and cost-effectiveness.
- Community Support – General assessment of support based on comments from the public, the Transportation Commission, elected officials, and other sources.
- Land Use and Economic Development - Activity center integration and economic development potential.
- Environmental Impacts - Traffic, right of way, construction impacts, noise, environmental justice, historic and cultural resources, ecological impacts, and visual impacts.

The alternatives were rated for each criterion using a 1 to 3 scoring system, with 3 being the highest and 1 being the lowest. The overall scores are reported below.

Alternative 1: Tempe Branch/Chandler Blvd LRT	38
Alternative 2: Chandler Blvd Bus Rapid Transit BRT	48
Alternative 3A: Arizona Ave LRT	36
Alternative 3B: Arizona Ave BRT	48
Alternative 4: Chandler Branch LRT	43

The two BRT alternatives, Alternatives 2 and 3B, have the highest ratings. This result is reflective of the low cost, low impact, and effectiveness of these alternatives in enhancing transit service. The next highest score is for Alternative 4, the LRT on the Chandler Branch Railroad right of way. Its minimal impacts, moderate effectiveness, and lower capital cost when compared to the other LRT alternatives, result in this rating. The lowest rated alternatives, Alternatives 1 and 3A, are both LRT alternatives with extensive in-street segments. They have higher costs and greater impacts.

E.4 LOCALLY PREFERRED ALTERNATIVE

The cost and performance information developed for the Tier 3 alternatives, coupled with the expected rate of development in Chandler and the prospects for project funding, led to the adoption of a phased approach to implementing high capacity transit improvements. Chandler's transit ridership potential will begin to be realized as the services in the Transit Plan Update are put in place. The increases in operating hours and frequency on existing routes, along with the new circulators, nonstop connectors, and express services, will greatly increase the availability and use of transit. As the ridership base grows, high capacity services can be added to upgrade service in key corridors and build even higher transit ridership .

With this approach in mind, the City Council adopted the phasing of transit improvements summarized in **Table E.1**. The transit improvements from the Transit

Plan update are shown in **Figure E-1**, while the high capacity projects are shown in **Figure E-2**.

Phase 1 - Transit Plan Improvements and Transit Priorities

The first step in Chandler's transit development program is the implementation of the bus service improvements in the Transit Plan Update. The initiation of several new neighborhood circulators, new and improved local routes, and express service upgrades will expand the travel options of Chandler's residents. The supporting infrastructure, ranging from bus stop improvements to new transit centers, will create a more useable system that is expected to attract riders and enhance service quality.

With several intersection improvements already planned and programmed for Chandler's arterial streets, the infrastructure for future BRT can begin to be constructed over the next 5-10 years. These elements would include:

- Queue Jumper Lanes - Bus Only lanes at intersections with a separate traffic signal phase to provide an early green to get ahead of traffic.
- Traffic Signal System Upgrades - Software enhancements to facilitate transit vehicle priority at signalized intersections.
- Bus Stop Improvements - Upgraded shelters, signs, and information.
- Fiber Optic Cable - Expanded communication capability for future signal priority systems and transit information dissemination to BRT stops.

These improvements will be useable by regular transit service even before BRT lines are implemented.

Phase 2 - BRT Services

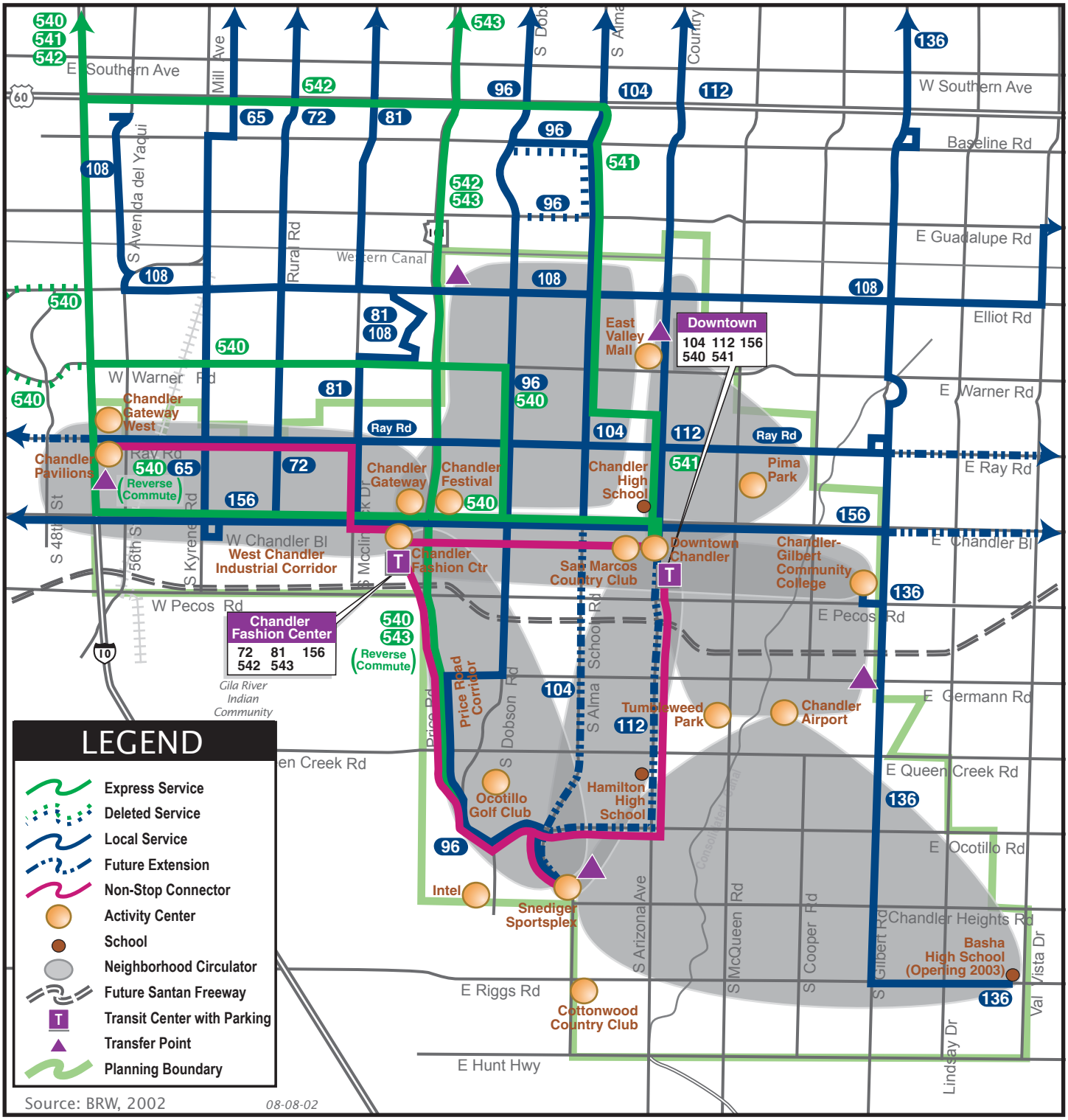
The BRT improvements would be constructed in the next 10-15 years and would provide BRT service in the mixed flow lanes of Chandler Boulevard, Rural Road, Arizona Avenue, and Williams Field Road. The corridors noted as "early" in Table E.1 have the highest travel demand of the Tier 3 alternatives, and can be expected to provide the greatest increase in transit ridership. Running BRT on Rural Road would enhance transit service and help build ridership for a future LRT line. It would also be compatible with Tempe's recently adopted transportation element, which calls for high capacity transit service on Rural Road.

The BRT service on Chandler Boulevard would provide a significant upgrade to serve the substantial demand between Ahwatukee, the Chandler Fashion Center, and Downtown Chandler. The BRT lines would also allow efficient use of resources by providing facilities along Chandler Boulevard that can be used by two high capacity routes. Together, these two BRT projects offer an excellent opportunity to provide cost-effective high capacity transit service.

Table E.1 Adopted Transit Phasing Plan

Phase	Action	Description
1	• Implement the service and capital improvements in the Chandler Transit Plan. • Implement transit system enhancements for bus and BRT service.	• Service includes neighborhood circulators, local, and express services. • System enhancements include queue jumpers, traffic signal priority features, and improved bus stops and transit centers.
2	Implement BRT service as warranted.	• BRT on Rural Road and Chandler Boulevard - Downtown Tempe to Downtown Chandler via the Chandler Fashion Center (early) • BRT on Chandler Boulevard - Ahwatukee to Downtown Chandler via the Chandler Fashion Center (early) • BRT on Country Club Drive and Arizona Avenue - Downtown Mesa to the vicinity of the Chandler Municipal Airport via Downtown Chandler (mid-term) • BRT on Chandler Boulevard and Williams Field Road - Downtown Chandler to Williams Gateway (long term)
3	Implement LRT service as warranted.	• LRT in Arizona Avenue/ Chandler Branch Railroad - Downtown Mesa to the vicinity of the Chandler Municipal Airport via Downtown Chandler (long term) • LRT in Rural Road/Chandler Boulevard corridor - Downtown Tempe to Downtown Chandler (long term)

Source: BRW, Inc., May 2003.



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Transit Plan Update and High Capacity Transit Major Investment Study

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Manuel Padron & Associates
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Figure E-1
Chandler Service Proposals and Activity Centers

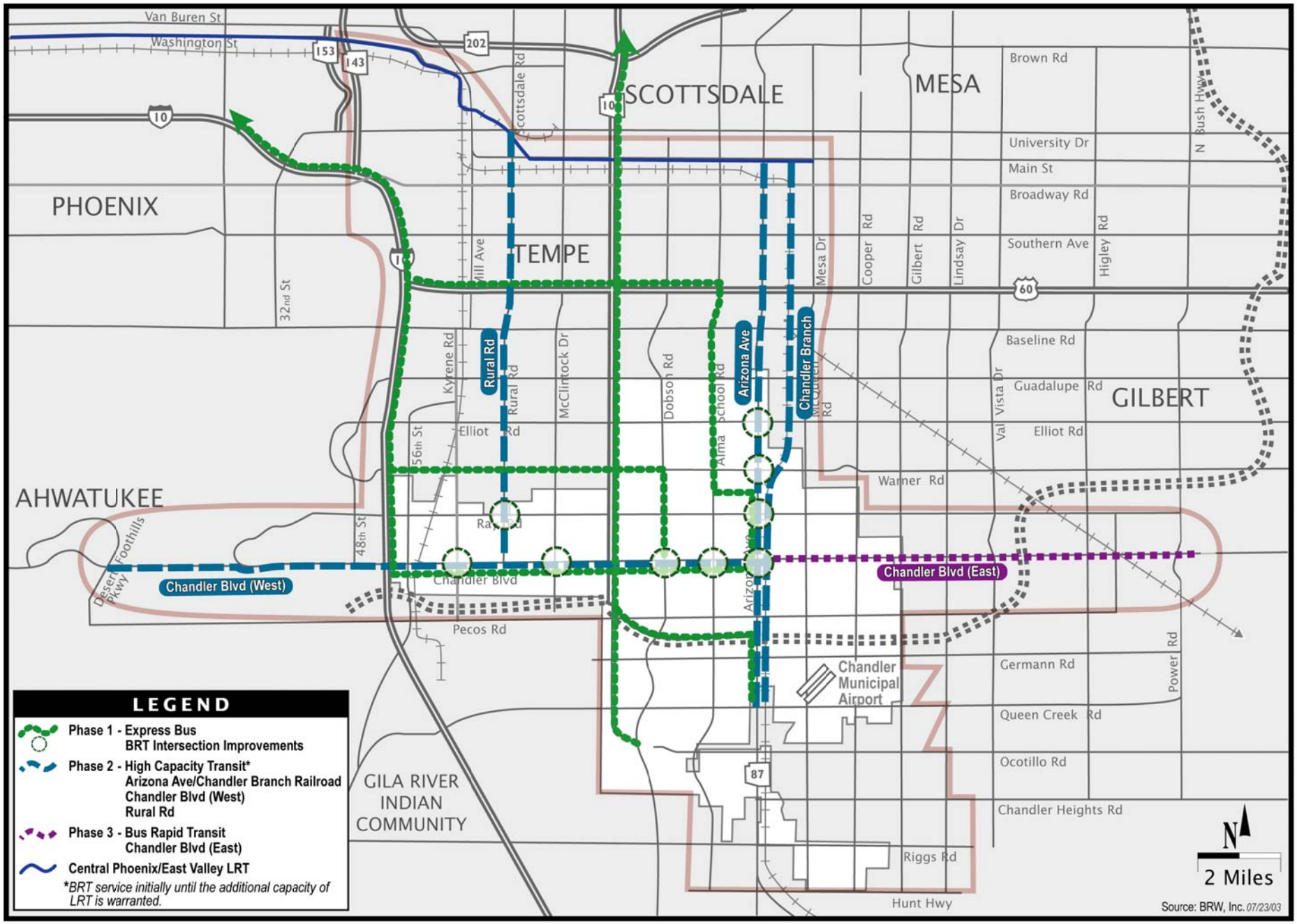

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Figure E-2
High Capacity Transit Phasing

The mid-term BRT improvements would take place in the next 10-20 years and include BRT service on Arizona Avenue. Like the early BRT lines, several intersection upgrades are planned and programmed in this corridor that can include elements of BRT infrastructure. The travel demand in this corridor is expected to take longer to grow to levels comparable to the early improvements, and thus the mid-term timeline is appropriate.

The BRT upgrades between Downtown Chandler and Williams Gateway Airport would be tied to the long term build out of this activity center, and is therefore designated as long term.

Phase 3 - LRT Service

The LRT projects in the Arizona Avenue/Chandler Branch Railroad and the Rural Road/Chandler Boulevard corridors are the longest term improvements, possibly 20 years and beyond, and would match long term growth in population, employment, and resultant travel demand. The LRT projects represent the highest level of capacity and service that is likely to be needed.

Although it was not included in the Tier 3 analysis, the use of Rural Road/Chandler Boulevard corridor was included in the locally preferred alternative to take advantage of opportunities and support from the City of Tempe. The Tempe Branch Railroad corridor was considered in the MIS, but it is not viewed favorably by Tempe. The designation of the Rural Road corridor is consistent with Tempe's plans and offers the opportunity for cooperative development of this long term LRT project.

E.5 CAPITAL AND OPERATING COST ESTIMATES

Estimates were developed for the high capacity transit projects for both capital expenses and annual operating costs. Summarized in **Table E-2**, these figures represent order of magnitude costs based on the conceptual engineering and analysis conducted in the MIS. They will be refined as the projects move into preliminary engineering and final design.

Table E.2 Capital and Operating Cost Estimates

Project	Capital Cost ($ millions)	Annual Operating Cost ($ millions)
Rural Road BRT	$35 - 70	$5 - 6
Chandler Boulevard BRT	$60 - 90	$9 - 10
Arizona Avenue BRT	$30 - 65	$4 - 5
Arizona Avenue LRT	$350 - 440	$8 - 9
Arizona Avenue/Chandler Branch LRT	$240 - 270	$6 - 7
Rural Road/Chandler Boulevard LRT	$375 - 485	$10 - 11

BRW, Inc. February 2003.

E.6 NEXT STEPS

Since federal transit funds will be sought for the implementation of the locally preferred alternative projects, the federal project development process will be followed. This process includes five basic steps as listed below.

1. Corridor Planning (sometimes referred to as Systems Planning, Alternatives Analysis, or Major Investment Study (MIS))
2. Preliminary Engineering and Environmental Review
3. Final Design
4. Construction
5. Operations Startup

A summary of each step is provided below, with more detail included in Appendix F.

Corridor (Systems) Planning

This step includes the analysis of various transportation improvement options, often for multiple corridors. Initial project descriptions are developed, along with estimates of capital and operating costs. An environmental reconnaissance is conducted to identify potentially fatal flaws. Public involvement is conducted. The process concludes with a locally preferred alternative that is included in the region's transportation plans. Chandler's High Capacity Transit Major Investment Study fulfills this step of the process.

Preliminary Engineering

Preliminary Engineering focuses on selected portions of the locally preferred alternative for more detailed analysis for the purpose of early implementation. The effort involves engineering to the 35 percent level to enable more detailed cost estimates to be developed and to facilitate the completion of the National Environmental Policy Act (NEPA) environmental process. A detailed funding plan is developed and the Federal Transit Administration (FTA) assigns a project management oversight (PMO) consultant to ensure the process is followed in accordance with FTA requirements. The lead agency for the project, which could be the City of Chandler, RPTA, or MAG, submits information to FTA for the annual New Starts report to Congress. The process concludes with the issuance of a Record of Decision by FTA and the project then moves into final design.

Final Design

Construction plans and a final project cost estimate are developed in Final Design. Right of way requirements, environmental mitigations, construction phasing, and project schedule are also developed in this phase. With this information, the project's financial plan is finalized and right of way acquisition takes place. During Final Design, a plan is developed for the collection and analysis of data for a Before and After Study which is required of all projects seeking a full funding grant agreement (FFGA). The FFGA stipulates the amount of funding FTA will provide and the conditions for construction of the project. Once the FFGA has been executed, additional federal funding for the project will not be recommended by FTA. Costs beyond the scope of the FFGA are the responsibility of the lead agency. Once the final design is complete, the project begins construction.

Construction

The capital improvements needed for the project are constructed in this phase. The cost and time required vary greatly, depending on the type and magnitude of the project. Funds are expended for contractors, construction management, and engineering support. For Chandler's proposed BRT and LRT projects, construction is estimated to take 24 months or more.

Operations Start Up

Once construction is complete, operation of the transit service can begin. This phase usually involves months of system testing. At the same time, public information is developed, operating and maintenance personnel are hired and trained, and opening ceremonies are planned. A well planned startup is key to the success of the project and requires a commensurate level of attention and resources.

E.7 FUNDING STRATEGY

The implementation of Chandler's locally preferred alternative projects depends on the development of a viable funding plan. It is expected that all of the projects will require a combination of federal, state, regional, and local funds. Up to 50 percent of the locally preferred alternative project costs would be funded with FTA Section 5309 New Starts funds. The financial analysis conducted for the MIS also assumed that Chandler would be eligible for direct FTA Section 5307 Urbanized Area funds beginning in 2005 because its population would likely reach 200,000 by then, which is the threshold for such funding. Details would have to be worked out with RPTA and MAG. Chandler would be eligible for FTA Section 5309 Bus Capital and Fixed Guideway Modernization in the future. These sources would fund 25 percent of future asset replacement costs.

There is the potential for using existing funding that Chandler has either not received or has only received minimally in the past. Chandler is planning to receive approximately $3.5 million in Congestion Mitigation and Air Quality (CMAQ) funds in the next five years, but it is unknown if these funds will be available in the future. It may also be possible to receive state DOT funding or federal Surface Transportation Funds (STP), which are controlled by the state.

The most significant funding source for these projects may come from locally generated sales tax revenue. Chandler is actively participating in the development of the upcoming regional transportation sales tax initiative, which would provide a large, locally controlled source of funding. These local funds would be used as match for state and federal funds, all of which would be needed to complete the funding plan for these projects.